REMARKS

The Official Action objects to Claims 2 and 3 for various informalities. Claims 2 and 3 have now been amended to address these informalities in the manner suggested by the Official Action. As such, the objections to Claims 2 and 3 are therefore overcome. The Official Action also rejects Claims 1-5 under 35 U.S.C. § 112, first and second paragraphs, for failing to comply with the enablement requirement, for being indefinite, for being ambiguous, for being incomplete and for being unclear. Independent Claim 1 has been amended in order to address each of the rejections under 35 U.S.C. § 112. Additionally, the Official Action rejects Claims 3-5 under 35 U.S.C. § 112, second paragraph, for lacking antecedent basis. Claim 3 has now been amended to provide proper antecedent basis for each term, thereby overcoming this rejection of Claims 3-5. Based on the foregoing amendments and the following remarks, reconsideration of the present application and allowance of the claims are respectfully requested.

As now set forth by independent claim 1, a method of simulating service loads includes: (A) developing a service load history database including multiple time series models representative of different service load conditions, (B) combining the multiple time series models, (C) adjusting a parameter of each of the time series models and creating an accelerated service load model, (D) regenerating random vibration load data based upon the accelerated service load model and (E) feeding the load data to a drive simulation system in order to cause the drive simulation system to simulate service loads in accordance with the random vibration load data.

As to the rejection under 35 U.S.C. § 112, first paragraph, for failing to properly enable the generation of service loads, independent Claim 1 has now been amended to recite "simulating service loads." In order to simulate a service load, a service load history database is developed which includes multiple time series models. The multiple time series models are then combined a parameter of each of time series models is adjusted in order to create an accelerated service load model. Random vibration load data is then regenerated based upon the accelerated service load model and the load data is then fed to a drive simulation system "in order to cause the drive simulation system to

simulate service loads in accordance with the random vibration load data." As described in the prior Amendment, each of these steps is described by the specification in a manner that will enable one skilled in the art to make and use the claimed invention and in such a manner that the resulting method satisfies the utility requirement.

As described on pages 3 and 4 of the present application, time series models are developed that are representative of different service loads. For example, page 4, lines 22-24 of the present application identifies exemplary service loads as those created by road surface fluctuations or fluctuations of wind pressures, *e.g.*, wind gusts. For each service load of interest, a time series model is developed and stored to permit future reconstruction of the service loads. In this regard, page 3, lines 28-30 of the present application states: "Original random vibration service loads are modeled in different time series models and stored in a computer for future reconstruction of service loads." For example, page 5, lines 8-11 of the present application notes that different time series models may be constructed to represent the service loads attributable to travel over a sand road, a concrete road, a soil road and an asphalt road. As set forth on page 3 of the present application, one common time series model is an autoregressive moving average (ARMA) model and another time series model is an AR(p) model. For example, page 4, line 30 – page 5, line 2 of the present application states that "[o]nly one AR(p) model is needed to represent one type of service condition. For example, for the ground vehicle random vibration, soil ground and concrete ground can be represented in two AR(p) models." Both the ARMA model and the AR model are well known to those skilled in the art such that one skilled in the art would understand the manner in which the parameters of the respective model, such as φ_i and φ_j, are to be determined for a respective service load. In this regard, page 4, lines 24 and 25 of the present application states that "[t]he least square method can be used to determine all of the model parameters." Additionally, the data that comprises the actual service load can be recorded in the field, such as directly from sensors. *See* page 4, lines 21 and 22 and page 5, lines 2 and 3 of the present application.

Once the time series models have been developed, the time series models are combined as described on page 5, lines 4-11 of the present application. As noted on page

4, lines 5-8 of the present application, multiple times series models, each representative of a different service load, may be combined in different proportions with the proportion depending upon the estimated time during which the object under test will be subjected to the respective service load during its anticipated lifetime. For example, if a vehicle under test is anticipated to travel over asphalt roads for 80% of its life and over gravel for 20% of its life, the resulting combination of the time series models would weight the time series model representative of the service loads to which the vehicle is subjected while traveling over an asphalt road by 80% and the time series model representative of the service loads to which the vehicle are subjected while traveling over a gravel road by 20%.

In order to create an accelerated service load model, a parameter of each of the time series models is adjusted. As described further in independent claim 3 and as similarly described by the present application, a parameter that is based upon the standard deviation σ_a of the distribution represented by the respective time series model may be changed to effectively accelerate the service load model. In this regard, the ARMA and AR models are described to represent normally independent distributions having a mean value of zero and a standard deviation of σ_a. *See* page 4, lines 7 and 8 of the present application. By changing the value of σ_a^2 in the resulting time series models, the resulting service load model is accelerated without altering the sequencing or the shape of the autospectrum of the reconstructed signals. *See* page 5, lines 12-16 of the present application.

Thereafter, random vibration load data is regenerated based upon the accelerated service load model. As described on page 5, line 18 – page 6, line 5 of the present application, the random vibration load data may be generated in a recursive manner based upon a series of random data $a_1, a_2 \ldots$ with the random data being generated such that the mean of the random data is zero and the standard deviation of the random data is σ_a. In accordance with the exemplary recursive formula set forth on page 5, lines 24-31, data $x_1, x_2, x_3 \ldots$ may be generated based upon the random data and the application of that random data to the accelerated service load model. The resulting data x_t, i.e., $x_1, x_2, x_3, \ldots$, is the random vibration load data and typically represents the amplitude of a load signal

at a respective time t (t = 1, 2, 3 ...). As those skilled in the art will recognize, the units of x_t depend upon the manner in which the service load is recorded and to be applied, such as in terms of displacement, acceleration or the like. The random vibration load data is then utilized to drive a simulation system, such as by converting the load data into digital signals (see Figure 2) that may then be utilized to "drive a computer-controlled actuator to simulate ground fluctuations, vibrations caused by propulsion systems, and/or vibrations caused by ocean waves, etc." *See* page 6, lines 8-10 of the present application.

As described above, the method of simulating service loads satisfies the enablement requirement in that the steps of the method set forth by independent Claim 1 are described by the specification in a manner that would be understood by one skilled in the art to allow multiple time series models representative of different types of service loads to be developed and then combined with a parameter of the resulting combination of the time series models being adjusted to create an accelerated service load model that is then utilized to generate random vibration load data that is utilized to drive a simulation system, thereby permitting accelerated testing of an object, such as a vehicle, under realistic test conditions. As such, the rejection of the claims under 35 U.S.C. § 112, first paragraph, is overcome.

As to the other rejections of Claims 1-5 under 35 U.S.C. § 112, second paragraph, it is similarly submitted that these grounds of rejection are overcome by amended Claims 1-5. In this regard, it is submitted that service loads are indeed simulated by the feeding of load data to a drive simulation system as now explicitly stated by amended independent Claim 1. As such, it is submitted that the rejection of Claims 1-5 under 35 U.S.C. § 112, second paragraph, for failing to particularly point out and distinctly claim the subject matter regarded as the invention is overcome. As to the allegation that Claims 1-5 are ambiguous, it is submitted that the service loads simulated by the method of Claims 1-5 are not ambiguous and are, instead, simulated service loads that are created in the manner set forth by amended independent Claim 1, as described above. As such, the rejection of Claims 1-5 under 35 U.S.C. § 112, second paragraph, as being ambiguous is also overcome. As to the rejection of Claims 1-5 as being incomplete for omitting the step of "generating service loads," independent Claim 1 has now been amended to be

directed to a method of simulating service loads which concludes with a step of "feeding the load data to a drive simulation system to thereby cause the drive simulation system to simulate service loads in accordance with the random vibration loads." As such, the method of amended Claims 1-5 is not incomplete and, instead, the claims recite all the essential steps to simulate service loads. Finally, the rejection of Claims 1-5 as being unclear is also traversed in that the feeding of load data to a drive simulation system causes the drive simulation system to simulate service loads in accordance with the random vibration load data, as now explicitly set forth by amended independent Claim 1. In this regard, for example, the random vibration load data may be utilized to drive a simulation system, such as by converting the load data into digital signals (see Figure 2) that may then be utilized to "drive a computer-controlled actuator to simulate ground fluctuations, vibrations caused by propulsion systems, and/or vibrations caused by ocean waves, etc." See page 6, lines 8-10, of the present application. For each of the foregoing reasons, the rejections of amended Claims 1-5 under 35 U.S.C. § 112, second paragraph, are therefore also overcome.

CONCLUSION

In view of the amendments to the claims and the remarks presented above, it is respectfully submitted that all of the claims of the present application are in condition for immediate allowance. It is therefore respectfully requested that a Notice of Allowance be issued. The Examiner is encouraged to contact Applicants' undersigned attorney to resolve any remaining issues in order to expedite examination of the present application.

It is not believed that extensions of time or fees for net addition of claims are required, beyond those that may otherwise be provided for in documents accompanying this paper. However, in the event that additional extensions of time are necessary to allow consideration of this paper, such extensions are hereby petitioned under 37 CFR § 1.136(a), and any fee required therefore (including fees for net addition of claims) is hereby authorized to be charged to Deposit Account No. 16-0605.

Respectfully submitted,

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